



# Care of Alum, Vegetable, and Mineral Tanned Leather

## Introduction

Alum, vegetable and mineral tanned leather items, such as boots, bags, and horse collars, are frequently found in museums in a stained and soiled condition. With disuse, these objects also tend to become hard and inflexible. Until the last several years, leather objects in museums had been cleaned and softened to the same degree as when they were in use. Current museum practice is to minimize the application of dressings, lubricants, and cleaners because of their negative long-term effects on the leather. Proper storage environments and supports are most important to leather collections, therefore preservation efforts should concentrate on improving these.

## Vegetable Tanned Leather

Vegetable tanned leather is produced by immersing prepared skins in a series of tanning liquors, which are made of tannin-rich vegetable matter (bark, leaves, twigs) in water. Once the tanning process is complete, oils or fats are often applied and worked into the leather to provide the necessary flexibility for use or for further manufacturing processes. Depending on the type of tannin in the vegetable matter used, the leather may be prone to a condition known as red rot, a degradation of the leather that eventually produces a red, powdery surface.

## Alum Tanned or Tawed Skin

A mixture of potash alum, sodium chloride, egg yolk, flour, and water is worked into softened skins to produce alum tawed leather. For centuries, this type of tannage has produced fine, flexible, light-coloured leather, and is still used today to produce a small number of glove leathers and some furs. Alum tawed leathers are easily damaged by water or moisture.

## Mineral Tanned Leather

Since the turn of the century, strong leathers with a high resistance to moisture have been produced by tanning with mineral salts, such as chrome and zirconium salts. Chrome tanned leathers can sometimes be identified by a blue-green line on a cut edge.

## Relative Humidity and Temperature

Leather should be protected from extremes and fluctuations of relative humidity (RH). Very dry conditions (less than 30% RH) will cause loss of moisture and embrittlement; high humidity (over 65% RH) encourages mould growth and hydrolytic degradation of the leather fibres. RH fluctuations may produce a progressive hardening of vegetable tanned leather. It may also cause the vegetable tans to migrate, resulting in the

leather's surface becoming darkened and brittle. If an object consists of leather that is stitched or tacked to another more or less responsive material, fluctuations may lead to buckling or splitting of the leather. A stable RH in the range of 45% to 55% and a temperature of 18°C to 20°C are the recommended environmental conditions.

Mould growth appears as a thin grey, green, or white powdery deposit or as small black dots on the surface of the leather. (Fatty blooms from dressings, soap from cleaners, and salts from perspiration during use may resemble mould growth. The first two tend to be slightly waxy in texture, and the last is crystalline.) Since mould requires a relative humidity in excess of 65% to grow, adequate RH controls and air circulation will prevent its outbreak. If signs of mould growth are noticed on leather objects, lower the RH of the ambient environment, isolate the affected objects, and slowly dry them by increasing air circulation with a fan or by placing them in a drier, well-ventilated room. Clean objects following the guidelines in CCI Notes 8/1, *Removing Mould from Leather*.

Locally elevated temperatures (e.g., inside a hot display case or near a radiator in a storage area) can also accelerate deterioration of leather through desiccation and protein denaturation, and should be avoided.

## Illumination

Unpainted leather is moderately sensitive to light and, consequently, can be subjected to a maximum of 150 lux with an ultraviolet light content of less than 75  $\mu\text{W}/\text{lm}$ . Painted or dyed leather can be extremely light-sensitive and should not be exposed to more than 50 lux with a maximum of 75  $\mu\text{W}/\text{lm}$  of ultraviolet light. As the damage due to light is cumulative and irreversible, exposure time should be limited. Avoid exposing any leather to spotlights, direct sunlight, or daylight, all of which can cause discolouration, desiccation, and photochemical degradation.

## Storage

As with most other organic materials, leather objects should, if possible, be stored in the dark. If illumination is necessary, do not exceed the recommendations given in the previous section. Dyed and painted leather objects should also be stored in the dark; if the storage room is lit, objects should be stored in boxes or in other closed containers.

Because of the humidity and temperature restrictions mentioned above, no leather objects should be stored over radiators or furnace pipes, in damp basements, or near sweating pipes. Wrapping the objects in hygroscopic materials, such as acid-free tissue or cotton fabric, and storing them in acid-free cardboard or corrugated plastic boxes helps protect the leather by reducing the effects of RH fluctuations.

Dust particles are harmful to leather objects because they attract water vapour and may contain pollutants that contribute to the degradation of the leather. Dust is also obtrusive, and can be very difficult to remove from a decorated or deteriorated surface. Protect leather objects in storage from dust by using polyethylene or cotton dust sheets, corrugated plastic or unbuffered acid-free cardboard boxes, or closed storage cabinets. Paper, matboard, and cardboard used as a support or padding material should be acid-free but unbuffered, since buffered materials are alkaline and are potentially harmful to leather.

Some insects such as dermestids (e.g., Hide and Carpet Beetles) will eat leather; others are attracted to the oils or decorative materials associated with the leather (quills, hair, binding media for pigments, etc.). Signs of insect infestation include recent small holes in the leather; a damaged surface due to insect grazing; and the presence of frass or larval casings in dark, protected areas on the object or on display supports and in storage containers. Good housekeeping is essential to the prevention of infestations: storage areas must be clean and

orderly, and the objects must be protected from dust. Collections should be inspected every three months for signs of mould or insect infestation. Information concerning procedures can be found in CCI Notes 3/1, *Examining for Insect Infestation*. If an infestation occurs, contact the Canadian Conservation Institute for advice regarding suitable control methods.

Metal components on leather objects, such as buttons, clasps, buckles, rivets, and nails, often show signs of corrosion. Copper and copper alloys (brass and bronze) react with the oils in the leather and form waxy green corrosion products (copper stearate) at their point of contact with the leather. Silver may also show these corrosion products if it contains some small amount of copper. Iron, iron alloys, and tinplate corrode when in contact with the acidic leather; these metals will cause the surrounding leather to become weak, brittle, and powdery. Whenever possible, prevent direct contact between the leather and metal parts by inserting a sheet of Mylar<sup>®</sup> or polyethylene sheet as an interleaf. See CCI Notes 9/1, *Recognizing Active Corrosion*, for more information on metals.

Leather objects, even those that retain some flexibility, should be fully supported while in storage and on display. It is difficult and often impossible to reshape artifacts that have sagged and become stiff while misshapen. Sharp folds or creases should be padded to avoid cracking and eventual splitting of the leather. Folds and rounded artifacts should be padded with unbuffered acid-free (neutral pH) tissue, and pouches should be filled with polyester batting or rolls of acid-free paper. Supports of other shapes can be made from chemically stable foams such as polyethylene or polypropylene (e.g., Ethafoam<sup>®</sup> or Microfoam<sup>®</sup>). Stress should be relieved in large or long leather pieces, such as harnesses, whips, and belts, by storing them horizontally. Leather objects that have decorative elements or hardware should be examined to ensure that all

elements are securely held by the original fastening devices. Provide separate supports for heavy, attached elements to reduce the strain on the leather in the area of connection, and place the object in a container to prevent potential loss of elements or detached pieces.

## Handling

Providing adequate support is the most important aspect of the handling of leather. Long, thin sections, if brittle, will easily crack when bent too far. A box, rigid board, or tray covered with Ethafoam<sup>®</sup>, Microfoam<sup>®</sup>, or unbuffered acid-free tissue should be used to lift or transport such items. All leather objects, especially light-coloured leathers because they mark easily, should be handled with clean hands and should be protected from potentially troublesome materials such as pencils, ink, and newsprint.

## Cleaning

Surface dust and any loose dirt should be removed by gently sweeping a soft brush in the direction of a vacuum cleaner nozzle that has been covered with gauze. The gauze will collect any pieces that accidentally detach from the object. Avoid removing any deposits or stains that may have historical or ethnographic significance. Leather artifacts with red rot should be brushed very gently to prevent extensive loss of leather fibres.

Slightly ground-in dirt may be removed from smooth leather in good condition by gently working over the surface with white vinyl erasers (Magic Rub<sup>®</sup>) or powdered erasers (Skum-X<sup>®</sup> or Dandy Rub<sup>®</sup>). The latter are especially useful for cleaning alum tawed leathers, but light pressure should be used to avoid stretching fine skins. All particles of eraser, especially near metal fittings, should be meticulously removed with a brush and vacuum cleaner. Adhesive rubbers (e.g., Groom/Stick<sup>®</sup> Molecular Trap) can also be used.

The adhesive rubber is gently pressed onto the surface, and is then pulled off. As with any cleaning method, a small test should be conducted first on an unobtrusive area. Suede leather should not be cleaned with powdered erasers because the residue is very difficult to remove.

A moderately stiff brush can be used to clean suede that is in good condition.

Copper corrosion on decorative components or hardware should be removed using a wooden stick followed by a cotton swab that has been partially dipped in mineral spirits (e.g., Varsol<sup>®</sup>). Insert Mylar<sup>®</sup> strips under the metal while cleaning to protect the leather. The metal may be lightly waxed to slow further corrosion on the exposed surface (see CCI Notes 9/3, *The Cleaning, Polishing and Protective Waxing of Brass and Copper*). Further stabilization is difficult due to the metal's close association with the leather; it should only be undertaken by an experienced conservator.

## Leather Dressings and Saddle Soap

The application of leather dressings and saddle soap, as was recommended in the first edition of this CCI Note, is now not generally recommended as a treatment for leather. Dressings, which consist of oils, waxes, or oil emulsions, were applied in an attempt to make stiff leathers softer and more flexible. Many leather dressings are available on the market: British Museum Leather Dressing<sup>®</sup>, neat's foot oil, lanolin, etc. Research has since shown that dressings are generally not effective in preserving leather (McCrary and Raphael, 1987). Unless the oil content of the leather is known through chemical analysis to be too low, applied oils from a dressing can cause further stiffening by dehydrating the leather (Stambolov *et al.*, 1984). Furthermore, many oils and fats used in leather dressings lubricate in the short term but oxidize with time, resulting in additional stiffening of

the leather. There are many other problems created by applying a leather dressing, including the darkening of the leather's surface, the staining of surrounding materials and the risk of attracting dust or insects.

Saddle soap — used in the past as a "cleaner and conditioner," although originally developed as only a conditioner — has the additional problem of being very alkaline, which causes degradation of the leather. The soap can also react with the oils in the leather and leave a white scummy deposit on the surface.

Finally, and most importantly, museum objects do not need to be rendered flexible since their function is no longer the same as the original intended use. If objects are stored, displayed, used, and handled properly, flexibility no longer plays an important role. Care of stiff leathers should therefore **not** include the application of saddle soap or a dressing, but should instead be focused on handling procedures and proper support of the artifacts.

More drastic treatments than those outlined, such as reshaping or repairs to leather, should not be undertaken without consulting a conservator. For advice, please contact the Ethnology Section of the Canadian Conservation Institute.

## Suppliers

*Unbuffered, acid-free (neutral pH) tissue paper; acid-free paper (e.g., Permalife<sup>®</sup>):*

conservation supply houses; archival material suppliers, for example,

Bibliofiche  
9620, route Transcanadienne  
Montréal, Québec  
H4S 1V9  
Tel.: (514) 336-4340

or  
Carr McLean  
461 Horner Avenue  
Toronto, Ontario  
M8W 4X2  
Tel.: (416) 252-3371

*Ethafoam*<sup>®</sup> :  
suppliers of packing products

or  
Contact Dow Chemical  
Canada Inc. sales offices in  
Vancouver, Calgary, Regina,  
Winnipeg, Toronto, Montreal,  
Halifax, or St. John's.

*Microfoam*<sup>®</sup> :  
suppliers of packing products

or  
manufactured by  
E.I. DuPont de Nemours & Co. Inc.  
1007 Market Street  
Wilmington, Delaware 19898 U.S.A.  
(302) 774-1000  
Distributed in Canada by Canadian  
Paper and Packaging Co. Ltd.  
800 Cochrane Drive  
Markham, Ontario L3R 5N7  
(416) 499-7200

*Eraser material (Magic Rub*<sup>®</sup>*,  
Skum-X*<sup>®</sup>*, or Dandy Rub*<sup>®</sup>*):*  
office and drafting supply shops

*Groom/Stick*<sup>®</sup> *Molecular Trap:*  
Picreator Enterprises Ltd.  
44 Park View Gardens  
London NW4 2PN England  
Available in Canada through  
conservation supply houses.

*Polyester batting:*  
department stores; fabric stores;  
craft stores

*Coroplast*<sup>®</sup> *corrugated plastic board:*  
plastic supply stores

## Further Reading

Canadian Conservation Institute.  
*Care of Rawhide and Semi-Tanned  
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U.S.A.

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Copies are also available in French.

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